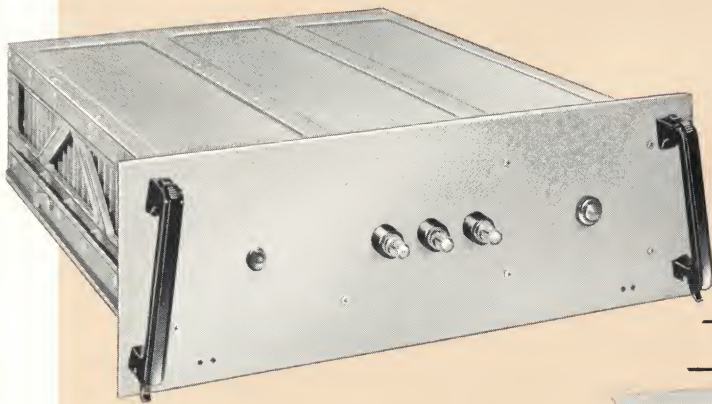


MOTOROLA

TECHNICAL

DATA SHEET



TELEPRINTER SYSTEM T P 3 0 0 0



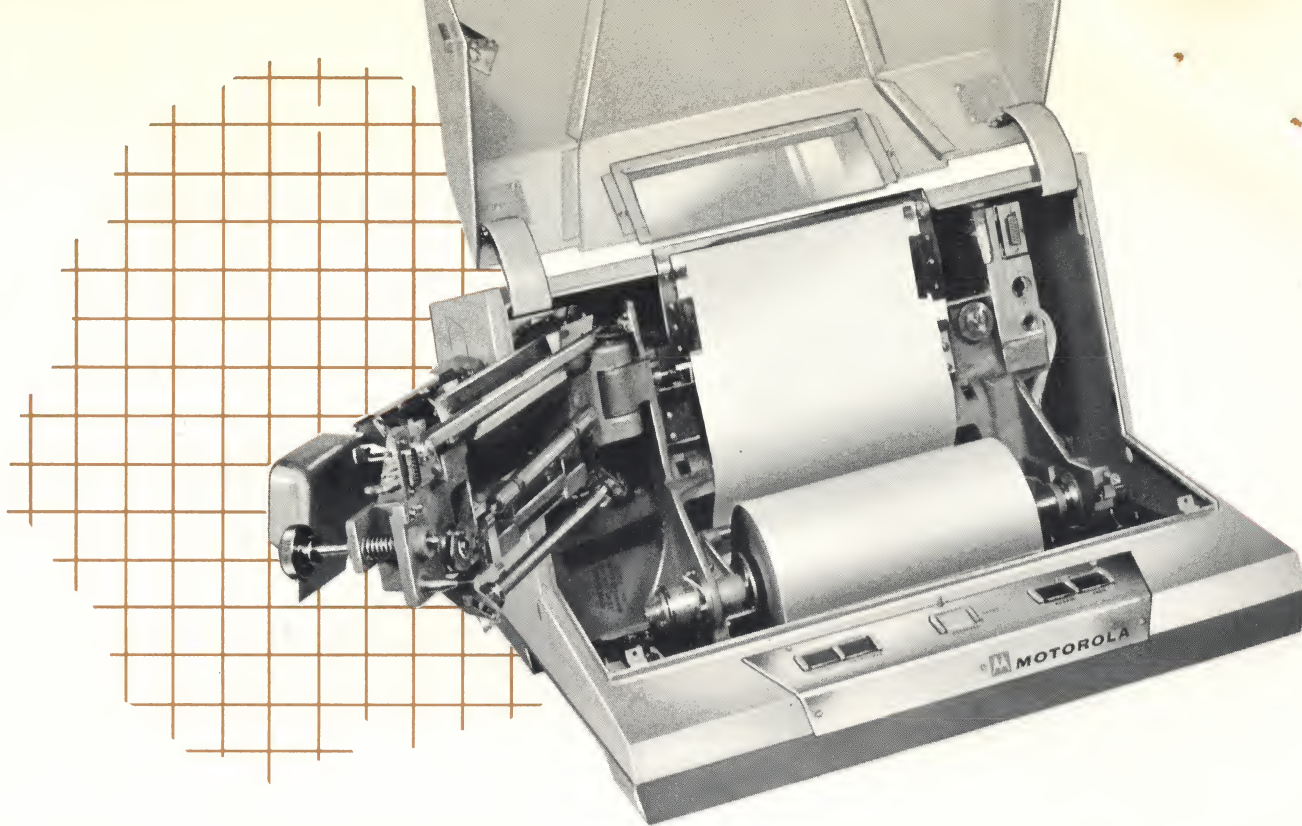
- 750-1500-3000 wpm • immediate hard copy readout—no processing • planned operational flexibility • all solid-state • modularized • silent •

- permanent, non-smear, high-contrast copy • desk-top printer, rack-mounted electronics • no impact mechanisms • meets MIL-E-4158 and MIL-R-26474 •



MOTOROLA INC.

Military Electronics Division Chicago Center



TELEPRINTER SYSTEM TP3000

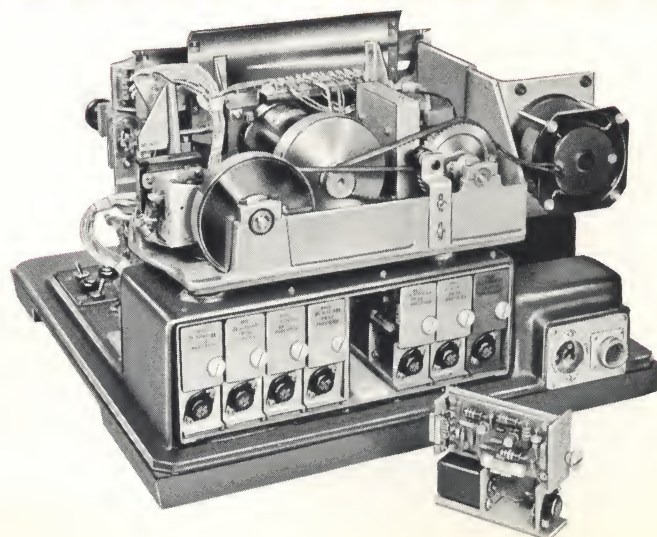
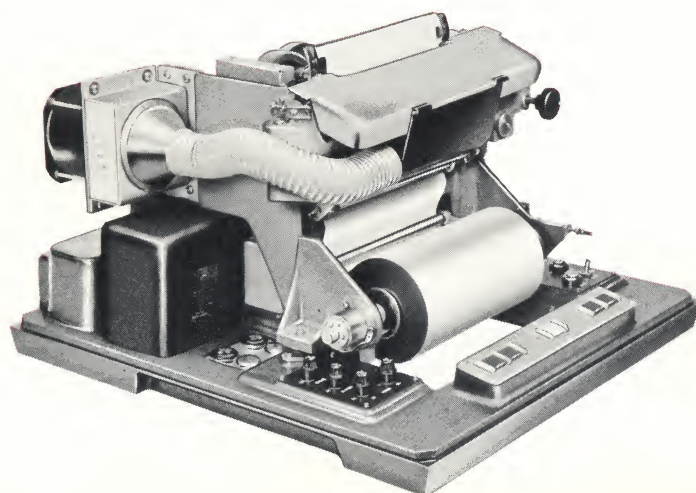
a high-speed . . . 750-1500-3000 words-per-minute . . . electronic page printer system, reliability engineered for dependable operation.

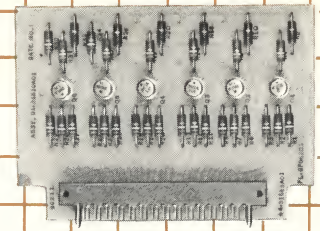
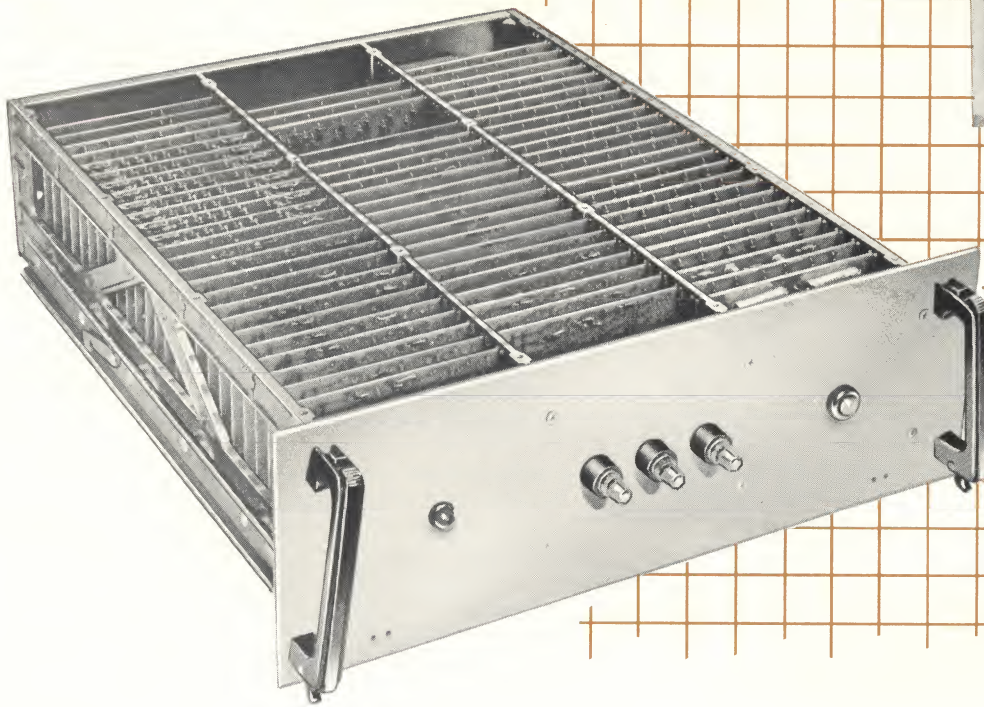
Motorola's Teleprinter System TP3000 is produced to rigid military specifications with performance verified by a stringent reliability and acceptance test program. The TP3000 was developed specifically for military high-speed data processing systems that require rapid *hard-copy* read-out of digitally-encoded messages. The TP3000 System accepts six-bit codes, such as Fieldata, translates these to a print code, and prints the decoded alphabetic, numeric, and symbolic characters on high-contrast electromarking paper.

Teleprinter System TP3000 makes use of a unique electronic printing technique that mini-

mizes the electronic and mechanical complexity normally associated with high-speed printer systems. This new printing technique has permitted compact, durable construction with unrestricted access to all parts. These features, plus long-term reliability, operational flexibility, and conformance to strict environmental standards, allow for adaptability of the TP3000 to air, sea and ground installations.

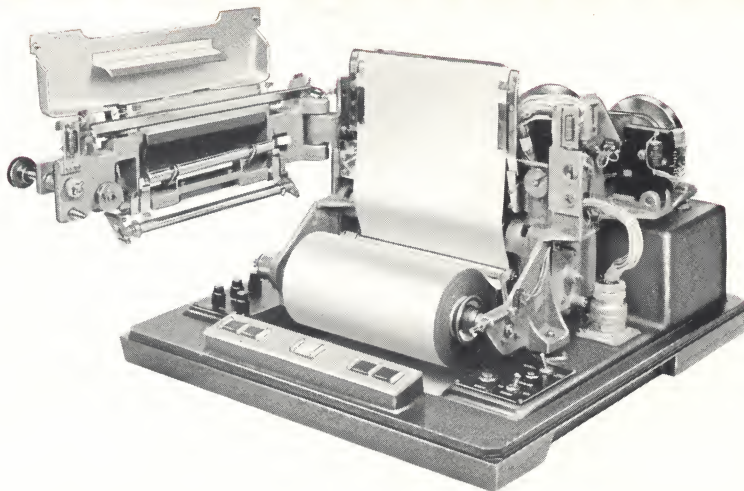
The TP3000 is functionally divided into two separate subsystems; one partly mechanical—the desk-top Page Printer—and one electronic—the rack-mounted Translator. This functional division accommodates those systems where data flow is from a central point to a multiplicity of remote points. Within systems of this type, the Translator can be installed at the data source and up to 33 selectively-addressed Page Printers can be located at those positions re-





RELIABILITY AND MAINTENANCE

Reliability, low mean repair time and economy were combined goals in the planning and engineering of Motorola's Teleprinter System TP3000. Components of the TP3000 meet the exacting requirements of MIL specifications. Each part has been individually selected to meet precise performance criteria. Time-proven design has been applied to all logic and timing circuitry to assure accurate message printout. The factors listed above, limited number of moving parts, and adequate derating margins contribute to high-reliability MTBF predictions—8500 hours for the Page Printer, 1900 hours for the Translator in normal operation. This predicted reliability, coupled with the normal preventive maintenance downtime of one hour per year, provides a printer system which can be depended upon to operate continuously.



The Teleprinter System packaging is in itself an advancement. Modular construction has been applied wherever feasible, including the print head and drive mechanisms. Dismantling of the entire system can be accomplished quickly without the aid of special tools. The portion of the Page Printer containing all of the moving parts can be removed from the base in 1/3 minute by detaching one connector and lifting the unit from its four vibration isolators. Access times of under one minute are likewise involved in the removal of the head carriage assembly and the printing head and belt assembly. Installation of a fresh paper supply roll can be done in 1/2 minute. The supply roll fits between spring-loaded, cone-shaped arbors. There is no complicated paper threading—only the sliding of the loose end of the paper between a guide on each side of the pressure plate.

Other maintenance features of the TP3000 include comprehensive test point provisions, provisions for testing Page Printer operation independent of the Translator and cover interlocks on the Page Printer.

TELEPRINTER SYSTEM

quiring immediate message distribution. The Page Printers can be remoted up to one mile from the Translator.

The function of the Page Printer is to produce printed messages in accordance with the information and instructions received from the Translator. The basic functions of the Translator are to convert incoming digital data into a form suitable for printout and to control the Page Printer operations. Simplicity of the printout technique is the key factor contributing to the economy of Motorola's Teleprinter System. When implementing multiple Page Printer installations, even greater economies can be realized because *only a single Translator is needed*.

Solid-state circuitry is used exclusively and all components have verified high performance ratings. Efficient packaging techniques have been applied throughout; the Translator occupies 1.7 cubic feet and the Page Printer occupies 3.2 cubic feet.

PAGE PRINTER

The Page Printer delivers immediately visible, permanent, smudge-proof, message copy, 72 characters per line at 5 lines per inch. *No further processing whatsoever is required*. Also, characters cannot be lost and overprints can never occur. At the end of a message, paper stock is automatically ejected at high speed to standard file length.

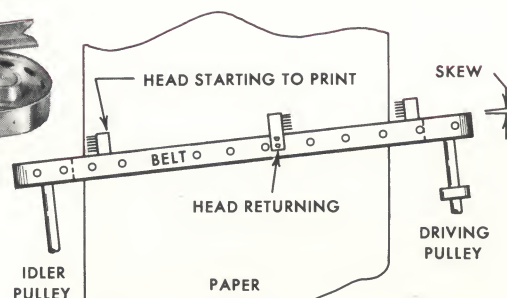
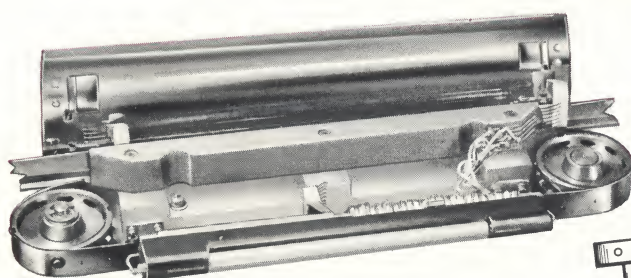
Reliable, high-speed printing is achieved in this Page Printer by interlinking dependable mechanical parts with a scanning head printing process. The design simplicity of the Page Printer stems directly from this printing process which allows smooth, continuous, unidirectional

motions. Simplicity is carried through to all elements of the Page Printer, as exemplified by the accompanying illustrations.

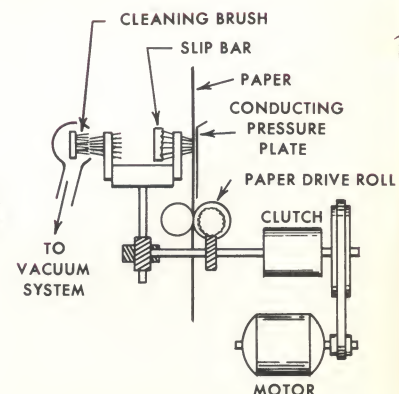
The alphabetic, numeric and symbolic characters are formed by selection of dots from a 35-dot (7 high by 5 wide) matrix. Printing is done with a print head which has seven styluses arranged in a vertical column. Print code signals, processed in the Translator and amplified within the Printer, are supplied to a seven-conductor electrode, or slip bar, along which the input ends of the styluses travel. During printing, the print head is swept horizontally across the paper. The paper is a highly-conductive, carbon-loaded electromarking paper possessing a thin mask coating of white semiconducting material. The application of a print code pulse generates a black dot by the destruction of the white material at the point of stylus contact with the paper.

The continuous, high-speed printout is achieved with three print heads attached to an endless, sprocket-driven belt encircling two pulleys (drive and idler). Heads are spaced evenly so that as a head leaves the right-hand margin, another head is ready at the left-hand margin to print the next line. As shown, the head transport mechanism is skewed upward to the right, and paper is driven upward at a fixed rate during printing. Thus, printing is produced horizontally on the page and each line is printed the proper distance below the preceding line. With this configuration, the effect of line feed/carriage return action is obtained smoothly, without intermittent motion.

The total Page Printer mechanism consists of 15 separately-moving parts. At the 3000 words-per-minute printing rate, the belt pulleys rotate at



FRONT



SIDE

EM TP3000

345 rpm and paper-advance drive rolls rotate at 25 rpm which demonstrates the ease of mechanical operation for high-speed printout. Motive power for these mechanisms is furnished by a heavy duty, hysteresis synchronous motor.

Wear rate of the styluses is negligible because of their hardness, low duty cycle and the light printing pressure. Printing residue build-up on the styluses is prevented by passing each print head over a cleaning brush and vacuum cleaner every time the head returns to line start position.

For situations requiring multiple copies, printed copy can be easily reproduced on conventional office duplicating machines. Or, commercially available duplicating material of the offset, stencil or spirit type can be used in place of the electromarking paper.

Five indicators show Page Printer operating status. These are labeled POWER ON, PRINTER OPERATIVE, MESSAGE RECEIVED-RESET, PAPER ALARM and manual PAPER FEED.

TRANSLATOR

The rack-mounted Translator drawer contains all of the system functions that can be shared by a number of Page Printers. These functions are character code processing, print instructions and format control.

The Translator accepts six-bit coded data delivered in single or multiple line increments. Incoming message characters are serially shifted into the Translator where they are fed through, successively, a single character buffer, a character decoder, a dot matrix coder, a column timer and pulse width control, and output line drivers. After a character is printed, a pulse is

generated demanding the succeeding character which is then gated into the single character buffer. The print code signals, which are read out at the dot matrix coder, are timed, shaped and amplified, and appear as dc level changes on seven parallel lines. These seven lines represent a single dot column of the five columns comprising the 35-dot array.

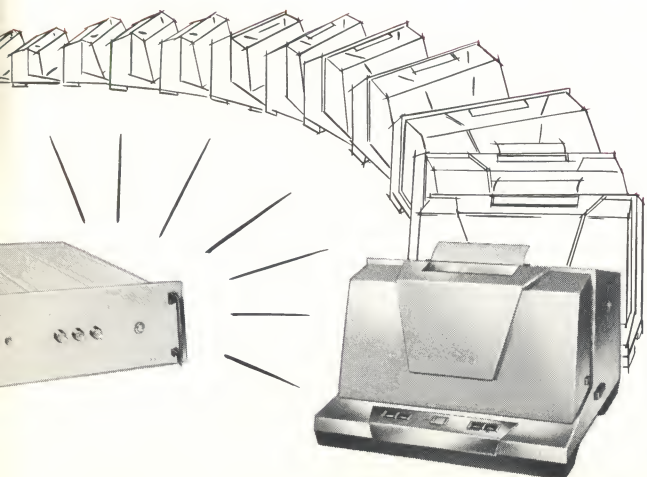
The balance of the Translator circuits consist of timing and Page Printer control elements. Timing is derived from an external synchronizing signal which controls the system clock. Since there are no start-stop actions to the print head motion, the Translator accomplishes format control by programming the timing of the demand signals sent to the external message buffer. This permits presentation of the print code signals to the print head when the print head is known to be in the proper position.

All of the printed circuit cards within the Translator are individually slot-mounted. Rigidity of mounting is assured by the pressure applied from the cushioning strips affixed to the access cover. The only control associated with the Translator is the 750/1500/3000 WPM selector.

SYSTEM FLEXIBILITY

Flexibility of the layout, of digital circuits, of mechanical assemblies and of operational characteristics were carefully planned in the TP3000 design. Variations in the system packaging for rack, console, single cabinet or vehicular mounting are possible. Exchange of circuit cards in the Translator for processing any six-bit code, for addition of programmed self-checking circuits, for remoting various numbers of Page Printers and for revising the message format can be readily accomplished. Also, the Translator can be modified to accept any specific alpha-numeric or numeric code and to process any character which can be formed from combinations of the 35-dot matrix structure. For installations that require format and timing control at the data source and print code translation at remote Page Printers, the Translator can be packaged into two drawers. *No modification to the Page Printer is necessary for any of the above design changes.*

In the Page Printer, the normal character size of 10 point ($1/7$ inch) can be changed to 12 point ($1/6$ inch) by print head substitution and a revision in the timing circuits of the Translator. Where ultra-high reliability requirements exist, Translators can be operated in parallel, providing a mean-time-to-failure prediction in the millions of hours.



CHARACTERISTICS

SIZE

Page Printer 22" x 24" x 15" (height)
Translator 19" x 21" x 5 1/4" (height)

LINES PER INCH 5

PAPER SUPPLY 500 feet, 8 1/2 inches wide

WEIGHT

Page Printer 100 lbs.
Translator 40 lbs.

ENVIRONMENTAL TESTS

Temperature Operating 0°C to +52°C
Non-Operating -54°C to +54°C

Altitude Operating 15,000 feet
Non-Operating 40,000 feet

Humidity 95%

Vibration MIL-T-4807, method 1A

Shock MIL-T-4807, method 3A

Radio Frequency Interference MIL-I-26600

DATA INPUTS

Mark -11 ±1.0V
Space - 1 ±1.0V
Sync Pulse -10 ±2.0V
Clock 2400 bits per second, square wave

RELIABILITY (predicted)

Page Printer 8500 hours
Translator 1900 hours

POWER REQUIREMENTS

Page Printer 120V, 60 cps, 300 watts
Translator -12 ±1.0V at 3A
+12 ±1.0V at 1A

ERROR RATE .001%

LINE LENGTH 72 characters

REGIONAL OFFICES

A keynote of the TP3000 design is the planned flexibility of packaging and operation permitting easy adaptation to suit specific installations and operational requirements. For further details, contact the nearest Motorola Regional Office.

BOSTON, MASSACHUSETTS
600 Main Street, Waltham 54, Mass.
TWInbrook 9-2139

DAYTON, OHIO
118 W. 1st Street, Dayton 2, Ohio
BALdwin 8-2502

HOLLYWOOD, CALIFORNIA
1741 Ivar Avenue, Hollywood 28, Calif.
HOLlywood 2-0816

RED BANK, NEW JERSEY
43 W. Front Street, Red Bank, New Jersey
SHAdyside 7-0020

ROME, NEW YORK
225 N. Washington, Rome, New York
FF. 7-7250

WASHINGTON, D.C.
1120 Connecticut Avenue, N.W., Washington 6, D.C.
FEderal 8-2930



MOTOROLA INC.

Military Electronics Division Chicago Center

1450 NORTH CICERO AVENUE, CHICAGO 51, ILLINOIS

DEAR SIR:

THIS MESSAGE WAS PRINTED AT A RATE OF 3000 WORDS PER MINUTE BY THE
MOTOROLA TP3000 TELEPRINTER WHICH IS DESCRIBED IN THE ATTACHED TECHNICAL
DATA SHEET. WE WOULD BE HAPPY TO DISCUSS YOUR INPUT/OUTPUT SYSTEM
REQUIREMENTS WITH YOU AT YOUR CONVENIENCE.

MOTOROLA, INC.



MOTOROLA INC. · Military Electronics Division / **Chicago Center**

May 18, 1964

Mr. Theodor H. Nelson
Ulster County Community College
214 W. Chestnuts Street
Kingston, New York

Dear Mr. Nelson:

Subject: Motorola High Speed Teleprinter System

Thank you for your interest in the Motorola High Speed Teleprinter System as indicated by your recent inquiry to DATAMATION. We are pleased to forward herewith a copy of our Technical Data Sheet for our TP3000 Teleprinter System and a Teleprinter Rate Calculator which you may find helpful in your work. Also enclosed is a sample of printing from the TP3000 Teleprinter.

The TP3000 Teleprinter System is completely militarized and has been assigned Air Force nomenclature Decoder, Pulse KY-417/FYQ-4 and Teleprinter, Electrographic TT-352/FYQ-4. This system is presently in production and units are being delivered for the Air Force 465L Strategic Air Command and Control System. Units are also being employed by the Army, Navy, and NASA for high speed hard copy readout of their data processing and digital data communications systems.

We wish to thank you again for your interest and request that you feel free to call on us for further assistance in meeting your hard copy output requirements.

Very truly yours,

MOTOROLA, INC.

Kenneth J. Martin
Manager, Teledata Marketing

KJM:lh
Enc.